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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/602,254
Filing Date: June 23, 2003
Appellant(s): FOX ET AL.

Randall K. McCarthy
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 10/10/06 appealing from the Office action mailed 2/28/06.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct. However, upon reconsideration of the claim in view of the arguments set for the in the Appeal, brief, the rejection of claims 1-13 and 25-28 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement are hereby withdrawn. Also upon reconsideration of the claim in view of the arguments set for the in the Appeal, brief, the rejection of claim 21 under 35 U.S.C. 103(a) as being unpatentable over Furuumi et al. (Furuumi) US Patent Application Pub No.

2002/0052985 in view of Jim Handy (Handy), The Cache Memory book, Academic Press, Inc., 1993, pp 5-8 and 64-84 is hereby withdrawn.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

2003/0105919	Olds et al.	6-2003
2002/0052985	Furuumi et al.	5-2002

Handy, Jim; The Cache Memory book, Academic Press, Inc., 1993, pp 5-8 and 64-84.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims: Since Appellant has made arguments that pertain to claims, 1, 21, and 25, only the rejections against claims 1, 21, and 25 have been presented here. The rejections to the other claims can be found in the Final Rejection mailed on 12/15/2005.

Claims 1, 21, and 25 are rejected under 35 U.S.C. 102(e) as being anticipated by Olds et al. (Olds) US Patent Pub No. 20030105919.

As to claim 1, Olds discloses a method comprising the steps of executing a first data transfer command (paragraph [0006] lines 1-5) and delaying executing of a second data transfer command ("a command to move to a new target' in paragraph [0009] lines 5-14 "By contrast, RLA involves receiving a command to move to a new target track, but because the target data block is a large angular distance away from the head, the drive

delays seeking to the new track and instead maintains the head on the current track and reads additional data blocks on the current track before moving to the destination track and reading the target data block. The foregoing strategies can provide improved performance under certain circumstances, such as when the command stream has a high degree of locality" and paragraph [0006] lines 1-5 (out of order command execution of multiple commands in a queue)) to transfer speculative data (paragraph [0008] lines 6-8, "not specifically requested the data from data blocks" and paragraph [0009] lines 5-12, "reads additional data blocks on the current track") in lieu thereof.

As to claim 21, Olds discloses a method comprising steps of transferring first data in response to an execution of a first pending command (paragraph [0006]), and transferring speculative data (paragraph [0008] lines 6-8, "not specifically requested the data from data blocks" and paragraph [0009] lines 5-12, "reads additional data blocks on the current track") instead of second data (paragraph [0009] line 11, "target data block") associated with a second pending command ("a command to move to a new target' in paragraph [0009] lines 5-14 "By contrast, RLA involves receiving a command to move to a new target track, but because the target data block is a large angular distance away from the head, the drive delays seeking to the new track and instead maintains the head on the current track and reads additional data blocks on the current track before moving to the destination track and reading the target data block. The foregoing strategies can provide improved performance under certain circumstances, such as when the command stream has a high degree of locality")

during a next available latency period ((paragraph [0009] lines 5-14, checking "a large angular distance" and paragraph [0007] discloses a definition for latency) read on this limitation) for the second command when the speculative data are adjudged as having a utility greater than a utility of the second data ((paragraph [0008], "A disc drive can typically employ various run-time selectable strategies (parameters) to improve the host throughput and read cache hit ratio, such as read on arrival (ROA) and read look ahead (RLA)." and paragraph [0007] "Selection of the execution order typically includes estimating how much time it would take to reach each of the data blocks associated with the pending access commands based on latency and the time required to perform any necessary head switches and seek.") read on this limitation since operation of speculative data utilizing run time selectable strategy such as read look ahead (RLA) and selection of the execution order would provide a great utility than a utility of the second data because it would improve the host throughput and read cache hit ratio and decrease latency).

As to claim 25, Olds discloses an apparatus comprising a controller configured to execute a first data transfer command (paragraph [0006] lines 1-5), and to delay execution of a second data transfer command ("a command to move to a new target' in paragraph [0009] lines 5-14 "By contrast, RLA involves receiving a command to move to a new target track, but because the target data block is a large angular distance away from the head, the drive delays seeking to the new track and instead maintains the head on the current track and reads additional data blocks on the current track before moving

to the destination track and reading the target data block. The foregoing strategies can provide improved performance under certain circumstances, such as when the command stream has a high degree of locality" and paragraph [0006] lines 1-5 (out of order command execution of multiple commands in a queue)) to transfer speculative data (paragraph [0008] lines 6-8, "not specifically requested the data from data blocks" and paragraph [0009] lines 5-12, "reads additional data blocks on the current track") in lieu thereof.

Claims 1 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Furuumi et al. (Furuumi) US Patent Application Pub No. 2002/0052985 in view of Jim Handy (Handy), The Cache Memory book, Academic Press, Inc., 1993, pp 5-8 and 64-84.

As to claim 1, Furuumi discloses a method (Fig. 1) comprising the steps of executing a first data transfer command (ccw1 paragraph [0061]) and delaying executing of a second data transfer command (paragraph [0061] ("staging does not always complete in the order staging is activated " and 'The command processing part 23 consults the staging completion report queuing table 255 to perform command processing, with the result that command processing is performed in the order staging completed") read on this limitation since the command processing is performed in out of order, the command processing would delay or skip a certain command input from the processor) to transfer data (target data in paragraph [0068]) in lieu thereof. However, Furuumi does not specifically disclose speculative data.

Handy discloses speculative data (pp 6, 72, and 84, spatial locality and reading in additional cache data during cache miss read on this limitation) for the purpose of increasing system speed.

One of ordinary skill in the art familiar with Furuumi, and looking at Handy would have recognized that the data access of Furuumi would have been enhanced by adding speculative data because it would increasing access speed. Increasing access speed would have a highly desirable feature in the data storage environment of Furuumi because the objective of data storage is increasing speed .

Accordingly, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate speculative data as taught by Handy into the system of Furuumi for the advantages stated above.

As to claim 25, Furuumi discloses an apparatus comprising a controller configured to execute a first data transfer command (ccw1, paragraph [0061]) and to delay execution of a second data transfer command (paragraph [0061] ("staging does not always complete in the order staging is activated " and 'The command processing part 23 consults the staging completion report queuing table 255 to perform command processing, with the result that command processing is performed in the order staging completed") read on this limitation since the command processing is performed in out of order, the command processing would delay or skip a certain command input from the processor) to transfer data (target data in paragraph [0068]) in lieu thereof. However, Furuumi does not specifically disclose speculative data.

Handy discloses speculative data (pp 6, 72, and 84, spatial locality and reading in additional cache data read on this limitation) for the purpose of increasing system speed.

One of ordinary skill in the art familiar with Furuumi, and looking at Handy would have recognized that the data access of Furuumi would have been enhanced by adding speculative data because it would increasing access speed. Increasing access speed would have a highly desirable feature in the data storage environment of Furuumi because the objective of data storage is increasing speed .

Accordingly, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate speculative data as taught by Handy into the system of Furuumi for the advantages stated above.

(10) Response to Argument

As an initial matter, the examiner notes the following discrepancy between the arguments set forth in the Appeal Brief and the rejections set forth in the final Office action. It appears that Appellant has argued the rejections set forth by the examiner as if those arguments were based on Figs. 4-6 in Olds '919. The examiner respectfully points out that the Examiner did not rely on Figs. 4-6 of Olds '919 in the final Office action mailed out on 12/15/2005, rather the examiner relied upon paragraphs (blocks) [0006] to [0010].

A. Response to argument regarding the rejection of claims 1-13 and 25-28 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement.

Upon reconsideration of the claim in view of the arguments set for the in the Appeal Brief, specifically pp 11-14, the rejection of claims 1-13 and 25-28 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement are hereby withdrawn.

B. Response to argument regarding the rejection of claims 1-13 and 21-28 under 35 U.S.C. 102(e):

1. Response to argument that the examiner has failed to show how Olds '919 discloses "delaying executing of a second data transfer command to transfer speculative data in lieu thereof":

Appellants' argument on pages 14-15 in the Appeal Brief that the cited reference does not disclose "delaying executing of a second data transfer command to transfer speculative data in lieu thereof" has been fully considered but it is not persuasive.

Olds discloses delaying executing of a second data transfer command (paragraph [0009], lines 5-14 "RLA involves receiving a command to move to a new target track, but because the target data block is a large angular distance away from the head, the drive delays seeking to the new track and instead maintains the head on the current track and reads additional data blocks on the current track before moving to the destination track and reading the target data block. The foregoing strategies can

provide improved performance under certain circumstances, such as when the command stream has a high degree of locality" and paragraph [0006], lines 1-5, "Disc drives of the present generation typically accommodate command queuing, which allows multiple input/output (I/O) commands to be received in a command queue and executed by the drive in an order different than that received.") to transfer speculative data (paragraph [0009], line 10, "reads additional data blocks" and paragraph [0008], lines 6-8 "not specifically requested the data from data blocks") in lieu thereof.

In other words, since a system accesses additional blocks utilizing a RLA (read look ahead) run time selectable strategy, the second seeking command to move to a new target is delayed because the system maintains the head on the current track and reads additional data blocks before moving to the next command track.

Olds further discloses execution of commands in a queue in a different order than the commands received reads on "delaying executing of a second data transfer command" since an execution of a certain command is skipped or delayed during the out of order execution of the commands in the queue. See paragraph [0006], lines 1-5, "Disc drives of the present generation typically accommodate command queuing, which allows multiple input/output (I/O) commands to be received in a command queue and executed by the drive in an order different than that received.".

2. Response to argument that the examiner cannot view the delays in initiating the seeks in Olds '919 as delay in the execution of the second command:

Appellants' argument on pages 15-17 in the Appeal Brief that the examiner cannot view the delays in initiating the seeks in Olds '919 as delay in the execution of the second command has been fully considered but it is not persuasive and the Examiner again notes that the rejection is based on paragraphs [0006]-[0010] in Olds '919 to reject the claims not Fig. 4-6.

ASince the seek cannot be executed without a proper command input, it is the examiner's position that the seek is part of the command. See paragraph [0051] in Olds "After a short overhead processing time (block 158) during which the interface circuit 124 identifies the second read command as the next appropriate command to execute, the controller 126 instructs the servo control circuit 142 to execute a seek (block 160) to move a selected head 112 to the second track 156. It will be recognized that the seek may include a head switch operation to activate and use a different selected head 112.".

Olds discloses delaying execution of a second data transfer command (paragraph [0009], "ROA involves performing a seek command to move the head to a destination track on which a target data block resides, and commencing to read the data blocks on the track that precede the target data block until the target data block reaches the head. RLA involves receiving a command to move to a new target track, but because the target data block is a large angular distance away from the head, the drive delays seeking to the new track and instead maintains the head on the current track and reads additional data blocks on the current track before moving to the destination track and reading the target data block. The foregoing strategies can provide improved performance under certain circumstances, such as when the

command stream has a high degree of locality".) In other words, a seek command is delayed in order to accommodate reads of additional data blocks if the target data block is a large angular distance away from the current position.

Also, Olds discloses delaying executing of a second data transfer command (paragraph [0006], lines 1-5, "Disc drives of the present generation typically accommodate command queuing, which allows multiple input/output (I/O) commands to be received in a command queue and executed by the drive in an order different than that received.") since, an execution of certain command is skipped or delayed during the out of order execution of the commands in the queue.

3. Response to argument that the examiner improperly relied upon the drawings of Olds '919 to disclose a feature not supported by the associated specification.

Appellants' argument on pages 17-20 in the Appeal Brief that the examiner improperly relied upon the drawings of Olds '919 to disclose a feature not supported by the associated specification has been fully considered but it is not persuasive.

As discussed above the Examiner has relied upon paragraphs [0006-0010] in Olds '919 to reject the claims not Figs. 4-6. In Olds a seek command (160) in Fig. 5 is delayed by RLA (Ref. 164) in view of a seek command in Fig. 4 in order to accommodate reads of additional data blocks if the target data block is a large angular distance away from the current position. This position is fully support by the drawings and specification of Olds.

4. Response to argument that the examiner has failed to show how Olds '919 discloses the "transferring speculative data" step as claimed by claim 21.

Appellants' argument on pages 21-22 in the Appeal Brief that the examiner has failed to show how Olds '919 discloses the "transferring speculative data" step as claimed by claim 21 has been fully considered but it is not persuasive.

Olds discloses transferring speculative data (paragraph [0009], lines 5-12, "reads additional data blocks on the current track" and paragraph [0008], lines 6-8, "not specifically requested the data from data blocks") instead of second data (paragraph [0009], line 11, "target data block") associated with a second pending command ("a command to move to a new target' in paragraph [0009], lines 5-14 "By contrast, RLA involves receiving a command to move to a new target track, but because the target data block is a large angular distance away from the head, the drive delays seeking to the new track and instead maintains the head on the current track and reads additional data blocks on the current track before moving to the destination track and reading the target data block. The foregoing strategies can provide improved performance under certain circumstances, such as when the command stream has a high degree of locality") during a next available latency period (paragraph [0009], lines 5-14, checking "a large angular distance" and paragraph [0007] discloses a definition for latency for the second command when the speculative data are adjudged as having a utility greater than a utility of the second data (paragraph [0008], "A disc drive can typically employ various run-time selectable strategies (parameters) to improve the

host throughput and read cache hit ratio, such as read on arrival (ROA) and read look ahead (RLA)." and paragraph [0007], "Selection of the execution order typically includes estimating how much time it would take to reach each of the data blocks associated with the pending access commands based on latency and the time required to perform any necessary head switches and seek.") read on this limitation since operation of speculative data utilizing run time selectable strategy such as read look ahead (RLA) and selection of the execution order would provide a great utility than a utility of the second data because it would improve the host throughput and read cache hit ratio and decrease latency.

C. Response to argument regarding the rejection of independent claims 1 and 25 under 35 U.S.C. 103(a).

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Handy teaches the use of speculative data (pp 6, 72, and 84, spatial locality and reading in additional cache data read on this limitation) for the purpose of increasing system speed. One of

ordinary skill in the art would be motivated to modify the data access of Furuumi to use speculative data as taught by Handy in order to increase the speed of the system.

1. Response to argument that the examiner has failed to establish a *prima facia* case obviousness in the rejection of independent claims 1 and 25 .

Appellants' argument on pages 23-27 in the Appeal Brief that the cited reference does not disclose "delaying executing of a second data transfer command to transfer speculative data in lieu thereof" has been fully considered but it is not persuasive.

Furuumi disclosure of delaying execution of a second data transfer command (paragraph [0061] "staging does not always complete in the order staging is activated " and "The command processing part 23 consults the staging completion report queuing table 255 to perform command processing, with the result that command processing is performed in the order staging completed") reads on this limitation since the command is processed in the order staging is completed not in the order it is received from the processor. In other words, since the command processing is performed in the order that staging is completed not in the order received from the processor, execution of some commands from the processor could be delayed in order to transfer data (target data in paragraph [0068]) in lieu thereof. However, Furuumi does not specifically disclose speculative data.

Handy discloses speculative data (pp 6, 72, and 84, spatial locality and reading in additional cache data during cache miss read on this limitation) for the purpose of increasing system speed.

One of ordinary skill in the art familiar with Furuumi, and looking at Handy would have recognized that the data access of Furuumi would have been enhanced by adding speculative data because it would increase access speed. Increasing access speed would have a highly desirable feature in the data storage environment of Furuumi because the objective of data storage is increasing speed (Note: this is a circular argument, it would be better if you had a different advantage).

Accordingly, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate speculative data as taught by Handy into the system of Furuumi for the advantages stated above.

2. Response to argument of the examiner has failed to establish a *prima facia* case of obviousness in the rejection of independent claim 21.

Upon reconsideration of the claim in view of the arguments set for the in the Appeal Brief, specifically pp 26-27, the rejection of claim 21 under 35 U.S.C. 103 (a) is hereby withdrawn.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Hong Kim

Conferees:

Lynne Browne

Sanjiv Shah

SANJIV SHAH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100

Day : Saturday
Date: 21-Apr-2007
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APPEAL CENTER RETURN

Application Number: 10602254 Date: 21-Apr-2007
Examiner: HONG, KIM GAU: 2185

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